

AMICON GROUNDSTATION USERS' GUIDE

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Chapter 1

AMICON GROUNDSTATION USERS' GUIDE

INTRODUCTION TO THE AMICON NETWORK

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Chapter 1 is a collection of messages to the early experimenters on the network, and any other material which may be relevant to coordinating North American use of the digital SSC.

This chapter will briefly summarize the hardware and software required to connect digital stations through a 10-MHz ground station. It is intended to be a guide to the user, and not a substitute for the more detailed manuals. A complete manual, the AMICON Specification, is available from the author and will be made available as soon as it is possible to get it into the hands of the user.

The author will be very pleased to receive corrections, updates, and other additional information which may be relevant to coordinating North American use of the digital SSC.

1.1 RF Hardware

Signal-to-noise ratio is the critical parameter for getting digital data through reliably, and as a good groundstation will have lots of attention on this. The "noise" is the thermal noise of the receiver. This noise is a function of the receiver's noise figure, the noise power spectral density, and the receiver's bandwidth. The receiver's noise figure should be as low as possible, and the receiver's bandwidth should be as narrow as possible. The receiver's noise figure should be as low as possible, and the receiver's bandwidth should be as narrow as possible.

Transmitter output power is a function of the receiver's noise figure, and should be as high as possible, and the receiver's bandwidth should be as narrow as possible.

1.2 Packet Hardware

Both TNC-2 and TNC-2X may be used as packet controllers. The TNC-2X is a more powerful unit, and is capable of adjusting parameters such as packet length and delay time.

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Chapter 1

INTRODUCTION TO THE AMICON NETWORK

Within hours of the opening of the AMSAT Oscar 10 (Phase III-B) transponder, packet radio enthusiasts began testing their ability to send digital data through the newest of the amateur satellites. The first reports came in from Ian Ashley, ZL1AOX, and were soon followed by tests and two-ways between stations in Maryland, California, New Jersey, and elsewhere. The initial results were encouraging, and performance continues to improve as stations tweak their equipment and techniques.

This document is designed to be a guide to help users of the digital special service channel get to know one another and to assist newcomers in planning their equipment and operations. The origins of this document come from a message the author sent out in May of 1983 asking for information on stations interested in participating in AMICON. A number of responses were received, and these are summarized at the end of this document, Chapter 3.

Chapter 2 is a collection of messages related to the early experiments on the satellite, and any other traffic bearing on the technical or operational aspects of using the special service digital channel.

This chapter will briefly summarize the hardware and software required to transmit digital information through AO-10. It is still very early in the game, and much experimentation has yet to take place. Nobody has all the answers, and the reader will certainly not find them all here. A companion document, the AMICON Specification, is currently being revised and will be made available as soon as the editing is done and as soon as a little more operational experience accumulates.

The author will be very pleased to receive corrections, updates, and any other additional information which may be relevant to coordinating North American use of the digital SSC.

1.1 RF Hardware

Signal-to-noise ratio is the critical parameter for getting digital data through reliably, and so a good groundstation will have lots of attention put into making sure that the "ears" are in top-notch condition. This means mast-mounted pre-amps, Gasfets if possible, and short cable runs. Antennas must be right-hand circularly polarized and pointed accurately. The general beacon should be heard at a level of 15dB above the noise or better.

Transmitter output seems to be less of a problem, and should be adjusted to be received at a level slightly above that of the general beacon.

1.2 Packet Hardware

Both Vancouver TNCs and TAPR TNCs may be used as packet controllers. The TAPR TNC currently has more flexibility in adjusting parameters such as packet lengths and delay times.



Most experiments have been conducted using standard 202 type modems, running at 600 or 1200 Baud, into an SSB transmitter. This technique works, but produces just marginally acceptable results, with reports of 80% to 95% copy. Users should not attempt AFSK-FM type transmissions. The bandwidth is too large and calculations show that the results would be worse than marginally bad.

Some AMICON groundstations have telemetry type PSK modems available, and others are planning experiments with new PSK and MSK designs.

It seems clear that at the moment, the design and availability of a good modem is the critical factor to the success of the AMICON channel.

1.3 Packet Software

Both the TAPR and Vancouver TNCs have implementations of the protocol agreed to at the AMSAT general meeting in October of 1982. This protocol is documented in the Proceedings of the Second ARRL Computer Networking Conference. The software for the VADCG TNC (LIPM/TIPM 5.1) is available through the AMSAT Software Exchange (contact R. Diersing, listed in the Directory).

Stations have found that sending short packets tends to produce better results, a direction which is opposite the conclusion of theoretical studies which show that you get eaten alive by overhead with short packets, and the larger packets you have, the better. Clearly this is related to the signal-to-noise and modem issue, and more work and careful testing needs to be done.

This is an exciting frontier in personal communications and personal computer networking. You are invited to make a contribution!

433.100 MHz	143.915 MHz	Center of up & downlink
433.140 MHz	143.940 MHz	proposed new 12 KHz freq.
433.170 MHz	143.970 MHz	proposed new 12 KHz freq.
433.180 MHz	143.980 MHz	-1 dB point
433.170 MHz	143.970 MHz	-3 dB point
	143.910 MHz	General Beacon

The bandwidth between the -1 dB points seems to match the 250 kHz figure which was measured on the ground. Also, the uplink / downlink frequency relationships seem to agree with figures provided earlier.

The following frequencies were measured as follows by the group while the ship was still on the ground:

TEMP.	0 deg. C	+15 deg. C	+35 deg. C
Freq. Beacon	= 143.905 MHz	143.907 MHz	143.908 MHz
Gen. Beacon	= 143.910 MHz	143.910 MHz	143.909 MHz
Downlink freq	= 143.905 MHz	143.905 MHz	143.907 MHz
Uplink freq	= 433.180 MHz	433.180 MHz	433.180 MHz

77. 21-4 X10V

Started on Aug. 8, 1982 8:15 AM PST 78-1 8013-1014-1744

Most experiments have been conducted using standard 300 type modems, running at 600 or 1200 baud, into an RS232 transmitter. This technique works, but produces just marginally acceptable results, with reports of 80% to 95% copy. Users should not attempt ASK-FM type transmissions. The bandwidth is too large and calculations show that the results would be worse than marginally bad.

Some AMICON groundstations have telemetry type PSK modems available, and others are planning experiments with new PSK and MSK designs.

It seems clear that at the moment, the design and availability of a good modem is the critical factor to the success of the AMICON channel.

1.3 Packet Software

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Stations have found that sending short packets tends to produce better results, a direction which is opposite the conclusion of theoretical studies which show that you get eaten alive by overhead with short packets, and the larger packets you have, the better. Clearly this is related to the signal-to-noise and modem issues, and more work and careful testing needs to be done.

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Chapter 2

CHRONOLOGY OF THE AMICON NETWORK

Posted: Sun Aug 7, 1983 4:22 AM PDT Msg: UGID-1603-8546
 From: RZWIRKO
 To: VRIP
 CC: AMSAT
 Subj: A-0-10 PASSBAND FREQUENCIES

I spent some time while the bird was at apogee measuring the passband limits and have come up with the following zero doppler frequency relationships based on my measurements. Please confirm these numbers if you can and if they match the results which you get. Please note that although the upper SSCs seem to fit OK with the originally published frequencies, the recommended L1 and L2 SSCs which you published will have to be corrected to reflect the actual measurements.

UPLINK FREQ.	DOWNLINK FREQ.	REMARKS
	145.987+MHz	Eng. Beacon (PSK)
435.027 MHz	145.977 MHz	-3 DB point
435.028 MHz	145.976 MHz	-1 DB point
435.032 MHz	145.972 MHz	H1 Special Service Channel(SSC)
435.042 MHz	145.962 MHz	H2 SSC
435.047 MHz	145.957 MHz	AMSAT Net & Calling Frequency
435.103 MHz	145.901 MHz	Center of up & downlink
435.164 MHz	145.840 MHz	proposed new L2 SSC freq.
435.174 MHz	145.830 MHz	proposed new L1 SSC freq.
435.178 MHz	145.826 MHz	-1 DB point
435.179 MHz	145.825 MHz	-3 DB point
	145.810 MHz	General Beacon

The bandwidth between the 1 DB points seems to match the 150 KHz figure which was measured on the ground. Also, the uplink / downlink frequency relationships seem to agree with figures provided earlier.

FYI the frequencies were measured as follows by the DL gang while the bird was still on the ground:

TEMP.	0 deg. C	+25 deg. C	+35 deg. C
Eng. Beacon	= 145.988 MHz	145.987 MHz	145.986 MHz
Gen. Beacon	= 145.8105MHz	145.810 MHz	145.8091 MHz
Downlink freq	= 145.906 MHz	145.903 MHz	145.900 MHz
(ref.=435.1MHz uplink)			

73, Rich K1HTV

Posted: Mon Aug 8, 1983 9:29 AM PDT Msg: MGID-1604-2764

Chapter 5

CHRONOLOGY OF THE AMICON NETWORK

Posted: Sun Aug 7, 1983 4:22 AM PDT
 From: NEWARK
 To: VRLP
 CC: AMSAT
 Subj: A-G-10 PASSBAND FREQUENCIES

I spent some time while the bird was at apogee measuring the passband limits and have come up with the following zero doppler frequency relationships based on my measurements. Please confirm these numbers if you can and if they match the results which you get. Please note that although the upper SSCs seem to fit OK with the originally published frequencies, the recommended L1 and L2 SSCs which you published will have to be corrected to reflect the actual measurements.

UPLINK FREQ.	DOWNLINK FREQ.	REMARKS
435.027 MHz	145.987 MHz	Eng. Beacon (75K)
435.038 MHz	145.977 MHz	-3 DB point
435.042 MHz	145.976 MHz	-1 DB point
435.043 MHz	145.973 MHz	L1 Special Service Channel (SSC)
435.045 MHz	145.962 MHz	L2 SSC
435.047 MHz	145.957 MHz	AMSAT Net & Calling Frequency
435.103 MHz	145.901 MHz	Center of up & downlink
435.164 MHz	145.840 MHz	proposed new L2 SSC freq.
435.174 MHz	145.830 MHz	proposed new L1 SSC freq.
435.178 MHz	145.826 MHz	-1 DB point
435.179 MHz	145.825 MHz	-3 DB point
	145.810 MHz	General Beacon

The bandwidth between the 1 DB points seems to match the 150 kHz figure which was measured on the ground. Also, the uplink / downlink frequency relationships seem to agree with figures provided earlier.

BTW the frequencies were measured as follows by the DL gang while the bird was still on the ground:

TEMP.	0 deg. C	+15 deg. C	+35 deg. C
Eng. Beacon	= 145.988 MHz	145.987 MHz	145.986 MHz
Gen. Beacon	= 145.810 MHz	145.810 MHz	145.809 MHz
Downlink freq	= 145.905 MHz	145.903 MHz	145.900 MHz
(ref. = 145.1 MHz)			
uplink)			

73, Rich K1RTV

Posted: Mon Aug 8, 1983 9:29 AM PDT
 From: NEWARK
 To: VRLP
 CC: AMSAT
 Subj: A-G-10 PASSBAND FREQUENCIES

From: IASHLEY
To: TCLARK
CC: AMSAT
Subj: AO-10 TRANSPONDER FANTASTIC !

Hi Tom,

I was so very pleased that you were my second contact on AO-10's transponder. The many years of hard work by you and the TEAM at AMSAT has at last turned what seemed like a dream to reality!

Please pass on my thanks to all concerned & especially to Karl, DJ4ZC & to Jan, W3GEY. WELL DONE!!!

ZL report - first hours of transponder:

Although the max. elevation was 7 dgs, many stations in ZL were successful in working through AO-10, while others were content to monitor the passband. Terry, ZL2BEM reported copying 29 different stations, including 5 countries. I worked 13 1/2 stations on SSB (the 1/2 was Terry, ZL1TCF who could rx but did not have enough power for tx). Signals were steady & averaged S 2 to S 3.

I also ran the Packet Radio on L1 from 0530 to 0600 - the cw ident was OK but the FSK was vy weak.

8/8/83: I copied you agn Tom at 0430Z while at ZL1TCF's QTH with severe fading from S 6 to zero. (DC9 el= 0). At my QTH I could just hear the peaks as my horizon towards USA is obstructed by rising ground.

At 1130Z I checked the passband on arrival home from a VHF meeting & found it full of stations. With only zero elavation my signals were S 7 (Kritz to 19 el RIW horiz.) & the best DX heard was a 4X4??? (not worked due QRM). The S/C Hi-gain antenna seems to be working well & although there were still very deep fades, they seemed less than at 0430Z.

The brief 40 minutes of pass tonight can only be described as F A N T A S T I C ! ! ! & I can't wait till tomorrow night.

Vy 73, Ian.

Posted: Sun Aug 21, 1983 7:51 PM PDT Msg: YGID-1611-2840
From: TCLARK
To: amsat
Subj: Packet Radio to ZL
Despite some problems here, this is the first (albeit VERY MARGINAL) 2-way packet radio QSO thru AO-10.

Ian and I will be attempting further transmissions on the L1 SSC frequency (145.830 downlink) using FSK (i.e. AFSK tones thru SSB xmtrs) following the Phase-3 standard (LSB up, USB down).

Tom

frame used
00-AE6692AE 924060B4 9862829E B0612F

W3IWI OZL1AOX0. .f...@`..b...a/

frame sent
00-B4986282 9EB060AE 6692AE92 406163 ZL1AOXOW3IWI 01 ..b...`.f...@ac
*** CONNECTED to ZL1AOX
state mod: 0 6 1 4

Due to problems here, no further packets were exchanged, but just wait 'till next time!!

Tom

Posted: Mon Aug 22, 1983 12:36 AM PDT Msg: DGID-1611-2975
From: HPRICE
To: AMSAT
Subj: PACKETS with ZL1AOX
Ian has now had two way with both coasts. During our short qso, I copied about 80% of my own stuff on the down link. Seems link real data transfer is only a step away.

Posted: Mon Aug 22, 1983 2:06 AM PDT Msg: JGID-1611-3033
From: HPRICE
To: amsat
Subj: Oscar 10 - Hot stuff!
A testimonial (as if any of you needed one)
on Oscar 10.

Ian, ZL1AOX and I were talking thru OSCAR 10. We were trying to send packets back and forth, with limited success. He went off to tea, leaving his TNC in beacon mode, transmitting every 20 seconds or so, while I adjusted my receiving setup. He came back and we went at it again. We discussed the difficulties and decided his TNC was more sensitive to noise than mine. We then discussed possible mods to make to his board. While he went off to heat up his soldering iron, I hacked on my computer. When he came back, we continued experimenting.

So what's interesting about this? Total elapsed time was about 100 minutes, Q5 copy, no fading, two adjustments for doppler, no antenna repointing. Oscar 10 is already starting to provide one of its important roles, a reliable tool for amateurs to use to advance the hobby, aside from being an interesting communications mode in itself. Another round of pats on the back for all concerned!

Harold, NK6K..

Posted: Mon Aug 22, 1983 10:42 PM PDT Msg: YGID-1611-8612
From: TCLARK
To: amsat
Subj: More Packet Radio Successes on AO-10
I have posted on the DOCS Bulletin Board a report on tonite's packet radio successes involving W3IWI, NK6K and ZL1AOX. It was a very exciting time and portends some very interesting possibilities for the future.

Posted: Mon Aug 22, 1983 10:37 PM PDT Msg: NGID-1611-8601
From: TCLARK

To: HMAGNUSKI
Subj: RE: L1 Frequencies

we started 145.830 on downlink (SSB definition) but moved up to abt .835 to get away from passband droop. See note on DOCS bulletin board to see how it wrks.

Posted: Mon Aug 22, 1983 10:43 PM PDT Msg: BGID-1611-8615
From: TCLARK
To: docs
Subj: Packet Radio on AO-10

Tonite was a remarkable nite -- multiple two-way packet radio tests were done by W3IWI, NK6K, ZL1AOX along with KA9Q and WA2LQQ as spectators. We used 1200 baud (and tried 600 baud) FSK on AMICON (L1) channel around 145.830-835 downlink. The following is edited do to show some of the traffic copied at W3IWI:

First, I set up my beacon to transmit the following message:

W3IWI>BEACON:W3IWI Packet Radio Test -- Anybody Copy?
The quick brown fox jumped over the lazy dog's back 0123456789

Then I repeatedly called CQ:

W3IWI>CQ:
W3IWI>CQ:cq de w3iwi
W3IWI>CQ:is anybody there??
W3IWI>CQ:hello packets de w3iwi
W3IWI>CQ:w3iwi packet radio test
W3IWI>CQ:via amsat oscar-10
W3IWI>CQ:
W3IWI>CQ:
W3IWI>CQ: (etcetera)

Nobody was around, so I worked myself, going up to the satellite, back to myself, up to the satellite again, and then back down:

cmd:c w3iwi via w3iwi
cmd:*** CONNECTED to W3IWI
*** CONNECTED to W3IWI
test
test

now is the time for all good men to come and have a party
now is the time for all good men to come and have a party
cmd:d
cmd:***disconnected

Then, after a long time of sending to myself with KA9Q spectating, ZL1AOX showed up (he used CAP's, I used lower case):

cmd:c zllaax
cmd:*** CONNECTED to ZL1AOX
hi ian -- how copy

OK I HAVE A CONNECT MSG TOM
ONLY OCCASIONALLY
ok, well I seem to copy u fb
DID U RX MY ACK?
yep
hi harold (NK6K called in on freq)
OK
RGR TOM IT'S NOT AS WELL AS IT SHOULD DOWN HERE
cmd:d
c nk6k
cmd:*** CONNECTED to NK6K
hi harold
Hello tom
seems pretty gud copy
Loks great
welcome to the wonderful world of racket radio !!!
Yep. am surprised,
1200 baud too
mebee we should tryy 600
Hot stuff!
etcetera

Then we tried a real first: I connected with myself, thru AO-10
to NK6K, who digipeated my packets back to me:

C W3IWI VIA NK6K
cmd:*** CONNECTED to W3IWI
TALK ABT DUMB THING TO DO
TALK ABT DUMB THING TO DO
cmd:D
cmd:***disconnected
C NK6K
cmd:*** CONNECTED to NK6K
DID U SEE WHAT I DID??
Copied 100%!!

Then we tried more experiments as NK6K and ZL1AOX tried to run my
computer remotely.

The only question remaining -- where are all the other packeteers
-- the AO-10 AMICON channel is now officially christened and
operating well. Who will be the next to join us?

Tom
Posted: Wed Aug 24, 1983 10:03 PM PDT Msg: WGID-1613-3666
From: HMAGNUSKI
To: tclark
CC: amsat
Subj: L1 in N. Cal.
Packets from W3IWI were successfully copied here in Menlo Park for the
first time this evening.

Posted: Sat Aug 27, 1983 6:00 PM PDT Msg: OGID-1614-7634
From: HPRICE
To: amsat

Subj: PSK on 145.837

Heard PSK on 145.837, what's up? Someone got PSK modems running on packet maybe?

Harold.

Posted: Sat Aug 27, 1983 9:24 PM PDT

Msg: VGID-1614-7849

From: RZWIRKO

To: TCLARK

CC: AMSAT

Subj: AMICON SSC FREQ?

Tom (and other Packeteers),

Hank Magnuski and others have asked if the AMICON SSC frequency could be better defined. Now that you and others have made a number of tests down on the low end of the A-0-10 downlink passband do you have any firm recommendations as to what the best frequency would be for these transmissions? I understand that 145.830 MHz presents some problems being so close to the band edge. Is it a problem of phase distortion or attenuation? In either case, if a frequency 5 KHz higher than the original one turns out to be a better choice, then serious consideration should be given to moving AMICON back to the L2 SSC and making L1 the CW/RTTY bulletin channel used by W1AW, GB2RS, LU4ENQ and other future bulletin stations.

If thats the case, then AMICON would move to a downlink freq of 145.840 MHz (L2) and W1AW & company would move to 145.830 MHz (L1). On the topic of frequencies, it appears that it might be better to define an SSC as a measured frequency (say at apogee) instead of referencing it to a beacon. On the H1 & H2 SSCs most of the time the Engineering beacon isn't even on and at the low end of the passband the PSK transmissions on the GB don't allow for easy measurement of a reference frequency.

Comments please.

73, Rich K1HTV

Posted: Sun Aug 28, 1983 12:42 AM PDT

Msg: XGID-1614-7981

From: RDUNBAR

To: rzwirko

CC: amsat

Subj: Frequencies

Glad you brought the subject up, Rich. It really IS a problem deciding which 'carrier' to measure against when the transmission is PSK. The only true reference which can be had is during the CW portion, and that's not often enough.

Unfortunately, any other measure (such as the one you mention..) is affected by doppler... no two stations can/will agree. Those (multitudinous) stations who don't have access to a computer have no way of knowing how much doppler they should compensate for.

From another angle, I have a problem. Tonight, I wished to

do automatic ranging at 5 minute intervals for a long period; it turned out to be from 0100 through 0400Z. I was in a quandary as to where in the passband I should actually do it... finally settled on 144.938 (as measured here) at the low limit of the defined 'user' passband. I figured that would keep me out of the CW users at that end.

Command stations will have need to do this sort of thing from time to time, as well as pass software and operational memos back and forth... where do we go? If we move up further into the passband, the normal user community will raise Cain... if we stay near the SSC's, THOSE folks are gonna yell! Let's face it.. a PSK signal at a level high enough to provide relatively error-free copy is going to be pretty broad and it SOUNDS terrible!

By the way, even though each ranging series is identified in PSK, I also transmitted an explanatory message in CW 6 times during the test mentioned above, even though that's not a requirement under the regulations. Figured that many users would wonder what the h--- that raucous signal was. I would really welcome comments, suggestions or discussion.

73, Ron WOPN

Posted: Mon Aug 29, 1983 12:14 AM PDT Msg: XGID-1614-8579
From: HPRICE
To: RZWIRKO
CC: AMSAT
Subj: AMICON SSC
Comments on AMICON SSC

Although exact measurements have not been taken to figure out why, more data goes thru above 145.830 than below. I'll try to gather better data as more packet stations get on the air, but I think a move to .840 wouldn't hurt.

Unfortunately, 145.830 is a "remote base two meter inter-tie" frequency in SoCal, every mountain top seems to have several 70cm remotes that can dump out on .830. A move to .840 won't help this problem much.

As predicted, we are beginning to square off out here, our uplink jams the ATV repeaters (there are two with inputs at 434.000 MHz in the LA area) and several simplex groups and the remote base crew jams our downlink. One of the ATV repeaters has its output at 1265.000 MHz, the other is at 1253.000.

An ATVer bought a set of September orbit predictions at a local swap meet to see when he could operate to avoid us. I hope I'm not around when he sees the 8+ hour passes with sliding 19 day windows.

This is correspondent NK6K, at the RF battlefield, Los Angeles, California.

(Actually its not bad yet, all sides are still talking at least...)

TO: HM
FROM: TC
SENT: 03 SEP 83 04:54:42
READ: 03 SEP 83 22:20:19

Had a phone call about 6PM tonite from Gordon Hardman, ZS1FE/KE3D who was calling from Durban, the site of the 1983 SA-AMSAT (South Africa AMSAT) annual meeting. He passed on to all the greetings of the SA-AMSAT membership as well as his and Molly's personal regards. I asked him to convey our greetings to the collected members of SA-AMSAT.

He reported that the new President of SA-AMSAT is Hans, ZS6AKV who replaces Greg, ZS1BI. Greg has for some time asked to be relieved 'cuz he is tired (sound familiar?), but has agreed to serve on their board of directors for another year.

Gordon also reported that he had been demonstrating TAPR TNC's and Packet Radio at the meeting and found great interest. Boards for use in ZS are desired ASAP and they will be writing TAPR to make arrangements. Gordon described PACSAT to the meeting, and found considerable support for an SA-AMSAT initiative to join in on the project working on user ground terminals. He asked me to "bless" this decision which I did wholeheartedly. I would therefore like to request that NK6K, KD2S et al get in contact with Gordon immediately to capitalize on their desire to participate.

Tom

Posted: Tue Sep 6, 1983 9:06 PM PDT Msg: CGID-1619-5974
From: VRIP
To: RMYERS
Subj: Mode B Stuff

Revised Mode B Frequency Guide*
(Exclusive of Doppler Shift)

Uplink		Downlink	
435.0323	Scheduled Use	145.987 MHz	Engineering Beacon
435.0423	Scheduled Use	145.9720	SSC H1
435.0447		145.9620	SSC H2
435.0477		145.9600	GCB Upper Limit
435.050		145.9570	ACNF
.055		145.955	
.060		.950	
.065		.945	
.070		.940	
.075		.935	
.080		.930	
		.925	

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

which are satisfied by the functions $u_i(x, y, z)$ and $v_i(x, y, z)$ in the domain D of the space E_3 bounded by the surface S .

It is shown that the system of equations is solvable in the domain D if and only if the functions $f_i(x, y, z)$ and $g_i(x, y, z)$ satisfy certain conditions. These conditions are expressed in terms of the integrals of the functions f_i and g_i over the domain D and the surface S .

The second part of the paper is devoted to the construction of the solutions of the system of equations. It is shown that the solutions can be expressed in terms of the functions f_i and g_i and their integrals over the domain D and the surface S .

The third part of the paper is devoted to the study of the properties of the solutions. It is shown that the solutions are unique and that they depend continuously on the data of the problem.

The fourth part of the paper is devoted to the application of the results of the paper to the problem of the existence of solutions of the system of equations which are satisfied by the functions $u_i(x, y, z)$ and $v_i(x, y, z)$ in the domain D of the space E_3 bounded by the surface S .

.085		.920	
.090		.915	
.095		.910	
.100		.905	
435.1037	Passband Center	145.901	
.105		.900	
.110		.895	
.115		.890	
.120		.885	
.125		.880	
.130		.875	
.135		.870	
.140		.865	
.145		.860	
.150		.855	
.155		.850	
.160		.845	GCB Lower Limit
435.1647	Scheduled Use	145.8400	SSC L2
435.1747	Scheduled Use	145.8300	SSC L1
		145.810	General Beacon

* Based on conversion frequency of 581.0047 MHz

SSC= Special Service Channel

GCB= General Communications Band

ACNF=AMSAT Calling and Net Frequency

Posted: Tue Sep 6, 1983 9:07 PM PDT

Msg: FGID-1619-5977

From: VRIP

To: RMYERS

Subj: Mode L Box

Preliminary Mode L Frequency Guide*
 (Exclusive of Doppler Shift)

Uplink	Downlink	
1269.050	436.950	Upper Limit
.075	.925	
.100	.900	
.125	.875	
.150	.850	
.175	.825	
.200	.800	
.225	.775	
.250	.750	
.275	.725	
.300	.700	
.325	.675	
.350	.650	
.375	.625	
.400	.600	
.425	.575	

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is of great importance in the theory of differential equations. The second part is devoted to the study of the properties of the solutions of the equation. It is shown that the solutions are unique and that they depend continuously on the initial conditions. The third part is devoted to the study of the asymptotic properties of the solutions. It is shown that the solutions tend to zero as the independent variable tends to infinity.

The fourth part is devoted to the study of the stability of the solutions. It is shown that the solutions are stable with respect to the initial conditions. The fifth part is devoted to the study of the periodic properties of the solutions. It is shown that the solutions are periodic with respect to the independent variable. The sixth part is devoted to the study of the properties of the solutions of the equation. It is shown that the solutions are unique and that they depend continuously on the initial conditions.

The seventh part is devoted to the study of the asymptotic properties of the solutions. It is shown that the solutions tend to zero as the independent variable tends to infinity. The eighth part is devoted to the study of the stability of the solutions. It is shown that the solutions are stable with respect to the initial conditions. The ninth part is devoted to the study of the periodic properties of the solutions. It is shown that the solutions are periodic with respect to the independent variable. The tenth part is devoted to the study of the properties of the solutions of the equation. It is shown that the solutions are unique and that they depend continuously on the initial conditions.

1269.450	Passband Center	436.550	
.475		.525	
.500		.500	
.525		.475	
.550		.450	
.575		.425	
.600		.400	
.625		.375	
.650		.350	
.675		.325	
.700		.300	
.725		.275	
.750		.250	
.775		.225	
.800		.200	
.825		.175	
1269.850		436.150	Lower Limit
		436.040	Engineering Beacon
		436.020	General Beacon

*Based on a translation frequency of 1706.00 MHz, estimated

TO: HM
FROM: HP
SENT: 08 SEP 83 03:34:59
READ: 08 SEP 83 07:11:38

Hank,

I can't locate the telemail message where I gave the time and dates of my first packets thru oscar 10, if you dumped the range of august 20-august 27 you'll probably see it.

My first two way was with ZL1AOX on 8/22 7:16-8:54 utc.
I believe oscar-10's first self connect via packet was me on the previous nite. Again, check back thru tmail, I think Skip mentioned that he saw it on your BB.

73,
Harold.

TO: HM
FROM: HP
SENT: 09 SEP 83 07:19:50
READ: 09 SEP 83 21:57:32

Hank,

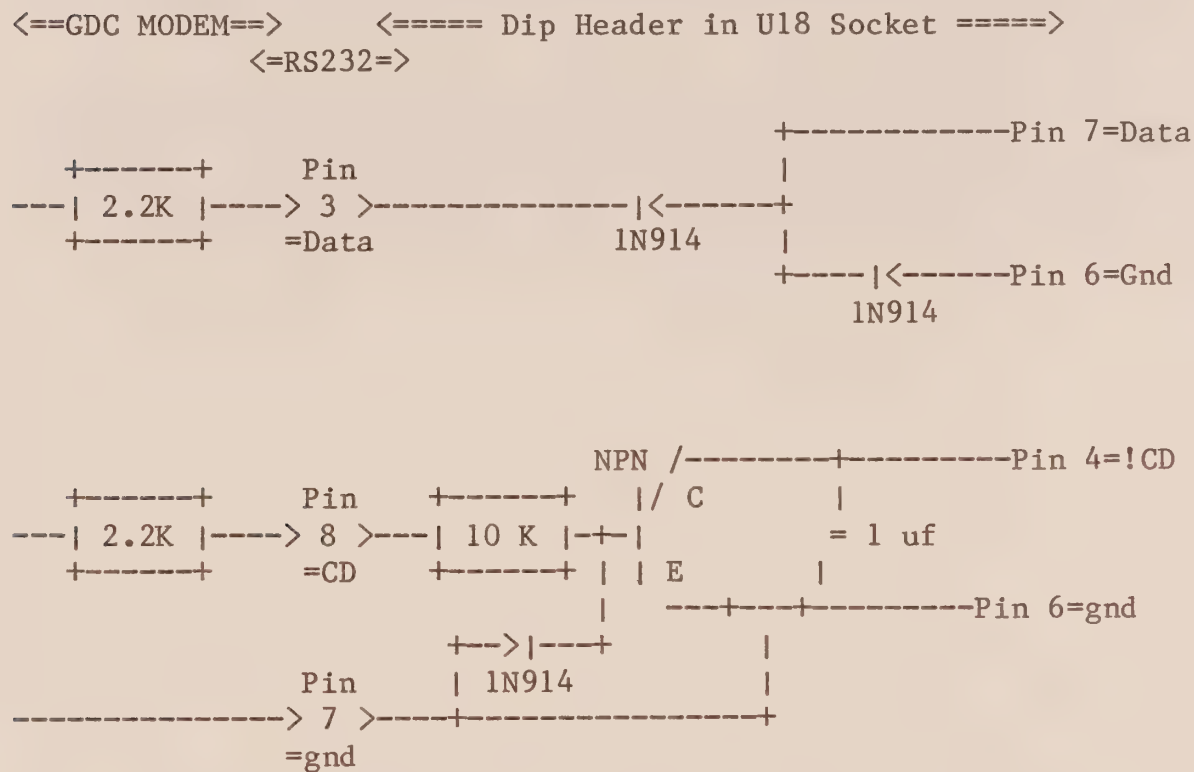
Ian, ZL1AOX says he was the first self connect on ao-10, 10:50-11:38 UTC on Aug 16. I was moving a 80 line file to myself at 1200 baud on ao-10 tonite with about 90% first time copy. Worked best with pacl=20 and maxf=2, although pacl=40 worked fine also. WA6JPR was also receiving 90% but could not transmit tonite due

to interface pppproblems. When will we hear you?

73,
 Harold

TO: HM
 FROM: TC
 SENT: 08 SEP 83 04:59:02
 READ: 08 SEP 83 07:12:58

As I mentioned earlier, I have had very good luck replacing the XR2211 demod chip in U18 on the TAPR TNC with an external 202 modem. The external modem seems to produce much better copy in the presence of noise (like thru AO-10 satellite). The external modem I am using is one of the General DataCom model 202-5B units that WA2LQQ found available in NJ/NY area in some abundance about a year ago. I have been asked to document the interconnection circuitry, so here goes:



Pardon the sloppy attempt at computer grafix, but the idea is to use diode clamps to convert data from RS232 to TTL, remembering that both pins 4 and 7 are pulled up to +5v on the TAPR TNC. The polarity if the data line is irrelevant since HDLC uses NRZI encoding. The Carrier Detect line must be inverted, so any old NPN transistor (e.g. 2N2222) can be used. The 1 uf cap across the !CD line prevents noise-induced interrupts and was found necessary to keep from fouling things up. The entire assembly (3 diodes, 1 transistor, 1 resistor) was assembled here on a 14 pin DIP header that replaced U18, but you may want to be more elegant and put it in a box. The two Pin 6=GND lines are obviously tied together, but the computer grafix would have been messy to show this. The GDC modem had 2.2k resistors on its outputs -- they are

shown above for completeness.

73, Tom

Posted: Tue Sep 13, 1983 4:57 PM PDT Msg: KGID-1623-6624
From: HPRICE
To: amsat
Subj: Full duplex Mode in TAPR TNC
For AO-10 / packet users.

I just remembered something that has always been in the TAPR TNC code but which hasn't had a good use up to now. The high order trace bit (\$4000) has a special meaning. This tells the TNC it is running full duplex, and each frame is ACKed separately. This will maximize thruput if two TNCs are connected with different downlink frequencies. When MAXF is set so that there is more than one frame in flight, the sender can send forever, since he sends frame n+1 at the same time that frame n is being acked. Obviously, this can not be used on a frequency that is being shared, since the TNC will never give up the frequency as long as any frame in the range N to N+MAXF-1 has been acked.

To get the most out of this, the watchdog timer on the TNC must be disabled, since keydown times of longer than 15 seconds are now possible. I don't recommend this mode for standard use, but it is interesting to experiment with. Try connecting to yourself and transmitting a small file. To enter this mode use the following command:

TRACE \$4000

Chapter 3

DIRECTORY OF AMICON GROUNDSTATIONS

Posted: July 21st, 1983
From: Stu Beal
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

G. Stewart Beal, VE3MWM
2391 Arnold Crescent
Burlington, Ontario, Canada L7P 4J2
Phone

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

VADCG

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

Founder of Hamilton & Area Packet Network, VE3PKT

Hank,

There are several people in the area who are active on packet, who are in the same position as I. We would like to begin looking at the facilities offered by the satellite. A veteran AMSAT member and satellite user, John Mitton, VE3IXT, is on the other side of the coin, so to speak: quite knowledgeable about operations and interested in getting into packet. I know this group would be interested in current activities, and I believe at least two of us (John and myself) would be willing to contribute what we can to the development.

Yours sincerely,

G. Stewart Beal, VE3MWM

Posted: May 26th, 1983
From: Harry Bluestein
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Harry Bluestein, N6TE
5533 Moonlight Lane
La Jolla, CA. 92037
619-454-1098

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

Hank,

In response to your message about Phase IIIB; there is interest in San Diego. Harry Bluestein is very interested in setting up for packet on the special services channel. I believe he already has his station set up (at least the RF end).

Please stay in contact with him either directly or through me as this area develops. Thanks. Mike WB6HHV

Posted: June 26th, 1983
From: Cliff Buttschardt
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Cliff Buttschardt, W6HDO
950 Pacific Street
Morro Bay, CA 93442
805-772-2132

Ed English, W6WYQ
1841 Pinecone Drive
San Luis Obispo, CA 93401
805-543-0543

Cuesta College Amateur Radio Club
P. O. Box J
San Luis Obispo, CA 93401
805-544-2943

2. Radio equipment, antennas

Mode J Stations currently in operation

3. Packet radio controller type (VADCG, TAPR, other)

n. a.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

Ed English is Chairman of Engineering Department and Club Trustee
Cuesta College RTTY Repeater 146.105/146.705, Apple II computer

Posted: September 4th, 1983
From: Tom Clark
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Thomas A. Clark, W3IWI
6388 Guilford Road
Clarksville, MD 21029
301-854-3113
Net address: Telemail, TCLARK; PRNET.TC

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

Both TAPR and VADCG controllers with AX.25.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

President of AMSAT

Posted: August 31st, 1983
From: Andrew J. Deskur
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Andrew J. Deskur, KALM
71 Adams Avenue
Methuen, MA 01844
617-688-0210, 800-225-0654 x3620

2. Radio equipment, antennas

435 ten watt transmitter
Helix antenna with 15 dB gain by Dom Mallozi, N1DM
VIC-20 Antenna Pointing System

3. Packet radio controller type (VADCG, TAPR, other)

Custom design by Jim Welch, W1XR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Beacon

5. Comments

Member of the PACSAT design team

Hank,

I am proposing the following: A packet radio beacon to be sent once every minute (synchronized to WWV). The information to be contained in that packet could start out as simple as just the date and the consecutive packet number for that day. The format could be expanded as the need presented itself.

This idea originated with Larry Kayser, who thought that there might be a need for a packet beacon on OSCAR 10. He argued that interested amateurs would then have access to packets, and could prepare their station for PACSAT.

73,

Andrew J. Deskur

Posted: Sun May 22, 1983 9:10 AM PDT

Msg: ZGEK-1570-9119

From: R Diersing

To: H Magnuski

Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Primary - Robert J. Diersing, N5AHD
4129 Montego
Corpus Christi, Texas 78411
(512)-852-3196

Secondary - Corpus Christi State University, N5AHD/5
6300 Ocean Drive
Corpus Christi, Texas 78412
(512)-991-6810-X293

2. Radio equipment, antennas

Equipment - Primary Station
KLM circular switchable antennas for 2m and 70cm
Kenwood TS700A, ICOM 251A, Kenwood TS520S
Microwave Modules MMT 432/28S
KLM 40w amplifier for 70cm.
Feedline on 70cm 7/8 in. Helix
Feedline on 2m 1/2 in. Helix
Computer controllable AZ/EL

3. Packet radio controller type (VADCG, TAPR, other)

VADCG (2), TAPR (1)
Packet Radio Controller - Secondary Station
Approximately September 1, 1983 (1) VADCG to be installed.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Potentially individual or gateway to Texas Intercity
Relay System. No club activity anticipated due to
little interest in Packet Radio locally.

5. Comments

Secondary station is receive-only at the present time.
Present configuration of this equipment is (1) VADCG
dedicated to 444.10/449.10 and 146.46 digipeater.
(1) VADCG and (1) TAPR available for connection to
various transceivers. Presently, TAPR to HF and VADCG
to VHF/UHF.
Cromemco S-100 Bus computers are available at both
locations for applications that might require computer
processing of data or control functions.

I am definitely interested in keeping informed on what is
developing even though I am quite off the beaten path.

Posted: September 4th, 1983
From: John Dubois
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

John Dubois, W1HDX
873 Hill Road
Boxborough, MA 01719
617-263-3192

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

Manager of AMSAT command station development

Posted: June 27, 1983

From: F Heyn

To: H Magnuski

Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Fried Heyn, WA6WZO, SW ARRL Vice Director
962 Cheyenne Street
Costa Mesa, CA 92626
714-549-8516

2. Radio equipment, antennas

220, 2 mtrs, 1296 equipment + antennas

3. Packet radio controller type (VADCG, TAPR, other)

TAPR "Beta" Site

4. Anticipated mode of operation (individual, club station, gateway, etc.)

I hope to be a "club station" on J mode for the
Southern California Amateur Radio Computer Club (SCARCC).

Posted: June 17th, 1983
From: Lyle Johnson
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Lyle Johnson, WA7GXD
5971 S. Aldorn Drive
Tucson, AZ 85707
602-889-8303

2. Radio equipment, antennas

An ICOM IC211 at 2 meters coupled with an ICOM IC701 and a Yaesu FTV-107R transverter are in hand. A KLM crossed yagi for 2 meters and a cush-craft crossed yagi for 435 are presently installed on an az-el mount. A 435 power amplifier will be added in a few weeks.

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Mode B for packet activity.

5. Comments

While some work remains to be done, Tucson definitely plans on being involved in the Phase 3 AMICON network. Mode L will follow, but probably not until the fall.

Posted: June 29th, 1983
From: Gary F. Kaatz
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Gary F. Kaatz, W9TD
125 Forest Park Lane
Hoffman Estates, IL 60194
312-885-7713
Net address: via PRNET.PE

2. Radio equipment, antennas

Drake 4-line pair used as a tunable IF and exciter for up-conversion.
Mode B operations planned

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

TO: HANK MAGNUSKI
FROM: STEVE GOODE (VIA PETE EATON)

HANK,

YOU SHOULD BE RECEIVING A LETTER FROM GARY KAATZ, W9TD.
HE HAS VOLUNTEERED TO ACT AS A GATEWAY INTO
THE AMICON CHANNEL OF OSCAR 10 FOR THE CHICAGO LAN BUT HAS NO
TECHNICAL INFORMATION ON THE AMICON CHANNEL
IF IT WOULD BE EASIER FOR YOU TO REPLY TO THAT
LETTER VIA PRNET, JUST SEND YOUR RESPONSE TO
PETES ACCOUNT AND WE WILL GET IT TO GARY.

73,

STEVE GOODE

Posted: Sun May 22, 1983 5:06 PM PDT
From: P Karn
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

Msg: JGEK-1570-9311

1. Name, address, call, phone, net-addresses

Phil Karn, KA9Q/2
61 Greenbrook Rd
Berkeley Heights, NJ 07922 (subject to change in the next 2 months)
201-322-4724
pkarn/amsat (telemail)
prnet.pk (prnet)
eagle!karn (uucp)

2. Radio equipment, antennas

Kenwood TR-9000, Heath 70w amp, ARR 35K GaAsFET preamp, Cushcraft 145-20T
(for 2m)
Heath SB-104A, Microwave Modules 432-28S, KLM PA15-110CL amp, KLM 432-18C,
SSB 70K GaAsFET preamp (for 70cm)
Dedicated 70cm BPSK modems under construction
Az/el rotors, Amsat station controller card for tracking
(no equipment for 23cm at present)

3. Packet radio controller type (VADCG, TAPR, other)

Both TAPR and VADCG controllers with AX.25.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

Posted: September 4th, 1983
From: H Magnuski
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

H. S. Magnuski, KA6M
311 Stanford Avenue
Menlo Park, CA 94025
415-854-1927
Net address: Telemail, HMAGNUSKI; PRNET.HM

2. Radio equipment, antennas

ARR 2M/10M downconverter to Yaesu FRG-7, KLM 70 cm amp, KLM antennas.
450 MHz uplink not specified as of this date

3. Packet radio controller type (VADCG, TAPR, other)

Both TAPR and VADCG controllers with AX.25.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

Source of VADCG LIPM/TIPM 5.1 AX.25 code

Posted: May 25th, 1983
From: Harold Price
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Harold Price, NK6K
1211 Ford Avenue
Redondo Beach, CA 90278
213-367-3147
Net address: Telemail, HPRICE; PRNET.HP

2. Radio equipment, antennas

IC 251A, TS830s, transverter, amp for 70 cm., KLM antennas

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

Hank,

I'm assembling a Phase IIIb station now, WA6JPR will probably also do one. Mine will be personal, for software testing and the like, WA6JPR will host the LAPG group gateway station. I'll have a TAPR TNC, IC 251A receiver, TS830s into a transverter and amp for 70cm, KLM antennas, etc. Will probably hold off on the 70cm stuff till esa gets it in orbit (I know, not the proper attitude).

Harold

Posted: July 5th, 1983
From: Bill Reed
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Bill Reed, WDOETZ
3110 Afton Drive
Carrollton, TX 75007
214-492-7508
Net Address: PRNET.BR

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

n. a.

5. Comments

Hank,

There are several (many) of us here in Dallas that are quite excited about Oscar 10 and the future L1 packet experiments. The local Amsat group is quite active and anxious to get involved. They have asked me to be the (official or unofficial, I dont know which) coordinator, question answerer, etc for packet activities via the satellite(s). I will attempt to solicit a list of names of interested experimenters and pass it along to you via this medium. I would appreciate any L1 or Amicon information you might have and I will pass it on to the others in this area via the local Amsat net and get together.

73,
Bill Reed WDOETZ

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862.

2. The second part of the document is a report from the Secretary of the Treasury, dated January 3, 1862, on the subject of the public debt.

Posted: September 4th, 1983
From: Rip
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Vern Riportella, WA2LQQ
Box 177
Warwick, NY 10990
914-986-6904
Net address: Telemail, VRIP

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

VADCG controller with AX.25.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

Executive Vice President of AMSAT

Posted: July 1st, 1983

From: E Shrum

To: H Magnuski

Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Ed V. Shrum, W2IKI
12 Harrison Avenue
Red Bank, NJ 07701

2. Radio equipment, antennas

Homebrew 435 MHz, 30 Watts, 10 turn Helix
1.269 GHz, 15 Watts, 1.2 meter dish

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

Posted: September 4th, 1983
From: cas
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Curtis Spangler, N6ECT
644 Ashbury Street
San Francisco, CA 94117
415-552-3430

2. Radio equipment, antennas

ICOM 251A, KLM antennas

3. Packet radio controller type (VADCG, TAPR, other)

Both TAPR and VADCG controllers with AX.25.

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual and gateway.

5. Comments

Posted: May 28th, 1983
From: John Spraggs
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

John Spraggs, VE7ADE

Vancouver, B.C.

Phone

Net address: PRNET.JS

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

VADCG

4. Anticipated mode of operation (individual, club station, gateway, etc.)

n. a.

5. Comments

Hank,

I would very much like to see an AMICON ground station set up here in Vancouver, however it will depend on the support I get from others whether it will go or not. Are all the present plans based on L1 in the J band? I am going to have to go back and study what I can find on the proposed standard as I am not too familiar with it yet.

Regards es 73

John, VE7ADE

Posted: September 4th, 1983
From: Rich Zwirko
To: H Magnuski
Subj: AMICON SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Richard Zwirko, K1HTV
12509 Ransom Drive
Glenn Dale, MD 20769
301-464-2133
Net address: Telemail, RZWIRKO

2. Radio equipment, antennas

n. a.

3. Packet radio controller type (VADCG, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

AMSAT Vice President of Operations

Posted: September 4th, 1983
From: Alan Zwick
To: H. H. H. H.
Subject: AMERICAN SUMMARY INFORMATION

1. Name, address, call, phone, net-addresses

Richard Zwick, K1HIV
13509 Hanson Drive
Glen Dale, MD 20769
301-464-2123
Net address: TELNET, K1HIV

2. Radio equipment, antenna

n. n.

3. Packet radio controller type (VAPC, TAPR, other)

TAPR

4. Anticipated mode of operation (individual, club station, gateway, etc.)

Individual

5. Comments

AMAT Vice President of Operations